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A. W. ANDERSON

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MULTIPLE SWITCH CONSTRUCTION

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FIG. 1

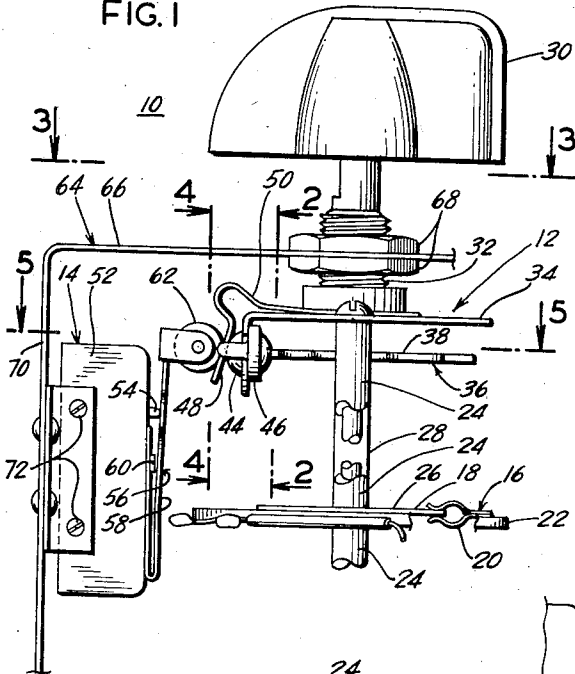


FIG. 2

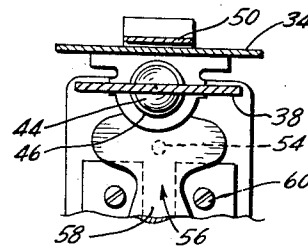


FIG. 3

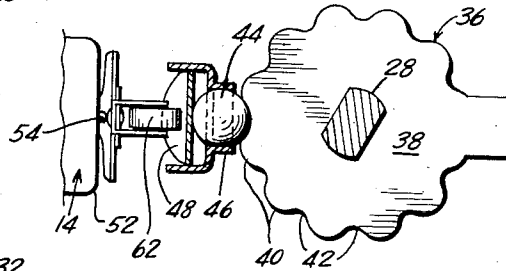
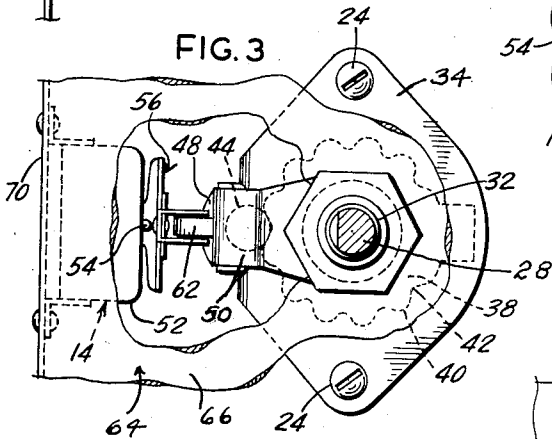


FIG. 5

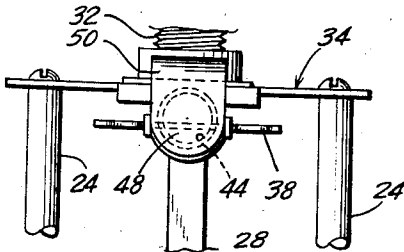


FIG. 4

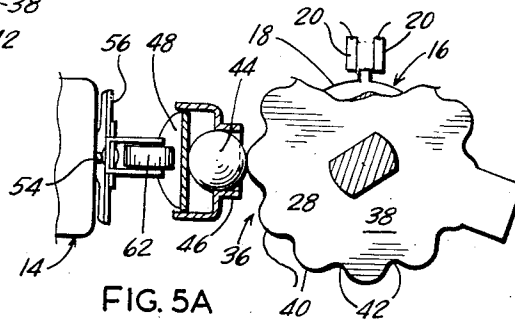


FIG. 5A

INVENTOR.
ARTHUR W. ANDERSON
BY *Mason, Kohnman,*
Rathburn & Wyss
ATTORNEYS

1

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MULTIPLE SWITCH CONSTRUCTION

Arthur W. Anderson, Janesville, Wis., assignor to The
Burdick Corporation, Milton, Wis., a corporation of
Delaware

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3 Claims. (Cl. 200—18)

The present invention relates to a multiple switch construction and has for its primary object the provision of a new and improved multiple switch including a rotary switch and a two position switch, such as a normally open on-off switch, operable simultaneously with the rotary switch.

A further object of the present invention is the provision of a new and improved multiple switch construction including a rotary switch including a plurality of stationary contacts and at least one movable contact, the positions of which are determined by a detent mechanism including a radially movable detent element, and an associated two position switch having an operating member located adjacent the detent element and operable by it to operate the switch to a particular position for the time that the movable contact is moving between adjacent contacts.

In brief, the multiple switch construction of the present invention includes a rotary switch having a plurality of stationary angularly spaced apart contacts and at least one rotatable contact selectively engageable with the stationary contacts. The movable contact is rotated by a manually rotatable shaft and positioned by a detent wheel mounted on the shaft. The detent wheel is provided with a plurality of radially extending teeth corresponding in number to the number of positions of the switch. A detent ball is mounted at the periphery of the detent wheel for movement radially of the wheel by the teeth as the shaft and switch are moved from one position to the next adjacent position. A normally open switch is mounted adjacent the rotary switch and it is provided with an actuating member mounted in proximity to the detent ball for movement by the latter as the rotary switch is moved from position to position. The normally open switch is located so that the normally open contacts are closed during the time that the movable contact is moving from one stationary contact to the next adjacent one. The arrangement whereby the switch is mounted for operation by the radial movement of the detent ball itself provides a very simple and yet effective multiple switch assembly. The normally open switch can be readily mounted adjacent the detent ball and its position can be readily adjusted to determine the duration of the time during which the normally open switch is closed.

Other objects and advantages of the present invention will become apparent from the ensuing description of an embodiment of the invention, during the course of which reference is had to the accompanying drawing, in which:

Fig. 1 is a fragmentary elevational view of the multiple switch construction of the present invention;

Fig. 2 is a fragmentary vertical sectional view taken along the line 2—2 of Fig. 1;

Fig. 3 is a horizontal cross sectional view taken along the line 3—3 of Fig. 1, the view being partly broken away;

2

Fig. 4 is a fragmentary vertical cross sectional view taken along the line 4—4 of Fig. 1; and

Figs. 5 and 5A are fragmentary horizontal cross sectional views taken along the line 5—5 of Fig. 1 illustrating the open and closed positions of the normally open switch operated by the rotary switch and of which Fig. 5A is partly broken away to indicate the manner in which the normally open switch is closed during the time that the movable contact associated with the rotary switch is moving between adjacent stationary contacts.

Referring now to the drawing and first to Fig. 1, it will be noted that the multiple switch construction of the present invention, which is indicated as a whole by reference character 10, includes a rotary switch indicated as a whole by reference character 12 and a normally open on-switch 14 mounted adjacent the rotary switch for operation by the latter.

The rotary switch 12 may be of a type including a plurality of wafers 16 each including at least one movable contact 18 and a plurality of angularly spaced apart contacts 20 (see also Fig. 5A), which stationary contacts are adapted selectively to be engaged by the movable contact in various of the operative positions to which the movable contact is adapted selectively to be moved. The stationary contacts are mounted upon a support 22 of insulating material and the various supports 22 of the various wafers are secured in assembled relation as by the mounting post structures 24 located at substantially diametrically opposite sides of the supports 22. The movable contacts are mounted upon a central insulating support 26 which is fixedly secured to an operating shaft 28 adapted to be rotated as by a knob 30 disposed at the upper end of the shaft. The shaft is mounted for rotation in a suitable bearing 32 secured to the upper side of a supporting plate 34 which is secured in turn to the upper ends of the mounting post structures 24.

The various operative positions of the rotary switch are determined by a detent mechanism indicated as a whole by reference character 36. This detent mechanism includes a detent wheel 38 fixedly secured to the shaft 28 for rotation therewith and having a series of peripheral teeth 40 between which are located depressions or valleys 42 (see particularly Fig. 5). The detent mechanism includes also a detent element, preferably the detent ball 44, bearing against the detent teeth 40 and located in a valley 42 in each of the operative positions of the switch. When the rotary switch is moved from one position to another, a detent tooth 40 moves the ball radially as may be readily noted from a comparison of Figs. 5 and 5A. The detent ball is mounted in cooperative relation to the detent wheel by a centrally apertured dependent flange 46 preferably formed integrally with the upper supporting plate 34. The ball is biased toward the detent wheel by the dependent portion 48 of a leaf spring 50 mounted above the plate 34 and between the latter and the bearing structure 32.

The normally open on-off switch 14 may be of conventional construction. It is illustrated primarily in Fig. 1 as including a housing 52 from which projects a switch actuating member 54. This switch may be of the type commonly called a micro-switch. It has a switch actuating element 54 operated by the detent ball 44 through the ball biasing spring leaf portion 48 and an intermediate movable element indicated as a whole by reference character 56. The element 56 includes a generally U-shaped support 58 of spring material having one leg secured as by screws or rivets 60 to the switch housing 52 and the free end of the other leg of which supports a

roller 62 engaging the dependent portion 48 of the ball biasing spring 50 whereby the switch 14 is closed when the ball is moved radially outwardly.

The switch 14 is adjustably mounted adjacent the rotary switch as upon a generally right angled bracket 64, the horizontal leg 66 of which is secured to the bearing structure 32 as by a pair of nuts 68 and the vertical dependent leg 70 of which is secured adjustably to the housing of the switch by the screws 72 whereby the position of the switch can readily be adjusted relative to the rotary switch.

Accordingly, it is a relatively simple matter to adjust the position of switch 14 so that it remains closed for the time necessary for the movable contact 18 to move between the adjacent stationary contacts 20.

From the foregoing detailed description of the present invention, it will be noted that there has been provided a simple and effective multiple switch including a rotary selector switch and a stationary on-off switch. The position of the latter may readily be adjusted and the switch may readily be mounted adjacent the rotary selector switch. A minimum of apparatus is required. The detent ball is moved radially outwardly by the teeth 40 each time that the rotary switch 12 is actuated. As the ball moves radially outwardly it closes the switch 14 until such time as the ball enters the next hollow 42. The described switch construction is adapted for many uses. It may, for example, be used in electrocardiograph equipment wherein certain control operations are to be performed during the interval of time that a selector switch is moved from one of its plurality of positions to another.

While the present invention has been described in connection with an illustrative embodiment, it should be understood that the details thereof are not intended to be limitative of the invention except insofar as set forth in the accompanying claims.

Having thus described my invention, what is desired to be secured by United States Letters Patent is as follows:

1. A multiple switch construction including in com-

ination, a frame having a front wall, a multi-position rotary switch including a plurality of spaced stationary contacts carried in fixed position on said frame and at least one rotatable contact, an operating shaft carrying said rotatable contact, rotatably supported by said frame and selectively operable to different switch operating positions in which said rotatable contact is in engagement with one of said stationary contacts, bearing structure on said frame journaling said shaft and including a portion extending forwardly of said front wall, detent means including a radially movable detent element for indexing said operating shaft in each of its switch operating positions, a bracket detachable secured on the forwardly extending portion of said bearing structure, and a second switch mounted on said bracket at a position displaced from the longitudinal axis of said shaft, said second switch having an operating member positioned adjacent said detent element and operable by said element when said shaft is moved from one of its switch operating positions to another.

2. The apparatus defined by claim 1 wherein said bracket includes a portion extending substantially normal to the shaft together with a depending leg extending parallel to said shaft and carrying said second switch.

3. The apparatus defined by claim 1 wherein said forwardly extending bearing portion includes an externally threaded portion and the bracket is mounted on said threaded portion.

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